## CLAIMS

1. A method for analysis comprising:

transmitting electromagnetic radiation through a plurality of metallic islands on a transparent substrate;

measuring a resultant optical property of said plurality of metallic islands on said transparent substrate;

adsorbing a chemical substance onto said plurality of metallic islands so as to produce a chemical substance-metallic islands moiety on said transparent substrate;

transmitting electromagnetic radiation through said chemical substance-metallic islands moiety;

measuring a resultant optical property of metallic islands in said chemical substance-metallic islands moiety; and

employing said resultant optical property of said metallic islands in chemical substance-metallic islands moiety and said resultant optical property of said metallic islands in said plurality of metallic islands so as to provide at least one of a quantitative indication and a qualitative indication of at least one of: said chemical substance-metallic islands moiety, a functionality of said chemical substance-metallic islands moiety, said plurality of metallic islands, a functionality of said plurality of metallic islands, said chemical substance and a functionality of said chemical substance.



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2. A method according to claim 1, and wherein adsorbing said chemical substance comprises producing at least one of the following interactions between the chemical substance and said plurality of metallic islands: a hydrogen bond, an ionic bond, a covalent bond, a Van der Waals force, an electrostatic force and a physical force.

3. A method according to claim 1, wherein transmitting said electromagnetic radiation through said plurality of metallic islands on said transparent substrate comprises transmitting electromagnetic radiation in the ultraviolet/visible/infra-red range.

4. A method according to claim 1, and wherein transmitting said electromagnetic radiation through said plurality of metallic islands on said transparent substrate comprises transmitting electromagnetic radiation in the range of 300-1100 nm.

5. A method according to claim 1, and wherein transmitting said electromagnetic radiation through said chemical substance-metallic islands moiety on said transparent substrate comprises transmitting electromagnetic radiation in the ultraviolet/visible/infra-red range.

6. A method according to claim 1, and wherein transmitting said electromagnetic radiation through said chemical substance-metallic islands moiety on said

transparent substrate comprises transmitting electromagnetic radiation in the range of 300-1100 nm.

7. A method according to claim 1, and wherein transmitting said electromagnetic radiation through said plurality of metallic islands on said transparent substrate includes transmitting electromagnetic radiation through said transparent substrate comprising at least one of the following: glass, plastic, polystyrene, a polymeric material, an inorganic oxide, quartz and mica.

8. A method according to claim 1, and wherein transmitting said electromagnetic radiation through said plurality of metallic islands on said transparent substrate includes transmitting electromagnetic radiation through said transparent substrate having a thickness of up to 5 mm.

9. A method according to claim 1, and wherein transmitting said electromagnetic radiation through said plurality of metallic islands on said transparent substrate includes transmitting electromagnetic radiation through metallic islands comprising at least one of the following: gold, silver, copper, titanium, vanadium, chromium, steel, at least one ultra-thin layer of a metal, a binary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium; or a ternary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium.

10. A method according to claim 1, and wherein said metallic islands are gold islands.

11. A method according to claim 1, and wherein transmitting said electromagnetic radiation through said plurality of metallic islands on said transparent substrate includes transmitting electromagnetic radiation through metallic islands having a thickness of up to 400 ..ngstrom units.

12. A method according to claim 11, wherein the thickness is between 10 to 100 ..ngstrom units.

13. A method according to claim 1, and employing said resultant optical property of said plurality of metallic islands comprises measuring a change in a surface plasmon absorbance of said plurality of metallic islands.

14. A method according to claim 1, and wherein said resultant optical property of said plurality of metallic islands comprises a peak of maximal absorbance.

15. A method according to claim 1, and wherein said resultant optical property of said chemical substance-metallic islands moiety comprises a peak of maximal absorbance.

16. A method according to claim 1, and wherein said resultant optical property of said chemical substance-

metallic islands moiety comprises an absorbance of said chemical substance-metallic islands moiety at a specific wavelength.

17. A method according to claim 1, and wherein measuring a resultant optical property of said chemical substance-metallic islands moiety on said transparent substrate comprises performing real-time measurements of said optical property of said chemical substance-metallic islands moiety.

18. A method according to claim 1, and wherein employing said resultant optical property of said chemical substance-metallic islands moiety and said resultant optical property of said plurality of metallic islands comprises comparing said resultant optical property of said chemical substance-metallic islands moiety and said resultant optical property of said plurality of metallic islands.

19. A method according to claim 1, and wherein measuring a resultant optical property of said chemical substance-metallic islands moiety on said transparent substrate comprises performing continuous measurements of said optical property of metallic islands in said chemical substance-metallic islands moiety.

20. A method according to claim 1, and wherein measuring a resultant optical property of said chemical substance-metallic islands moiety on said transparent substrate comprises performing kinetic monitoring of said

resultant optical property of metallic islands in said chemical substance-metallic islands moiety.

21. A method according to claim 1, and further comprising producing the plurality of metallic islands on the transparent substrate.

22. A method according to claim 22, and wherein producing said plurality of metallic islands producing said plurality of metallic islands from at least one of the following: gold, silver, copper, titanium, vanadium, chromium, steel, at least one ultra-thin layer of a metal, a binary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium; or a ternary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium.

23. A method according to claim 21 and wherein producing said plurality of metallic islands comprises evaporating said plurality of metallic islands.

24. A method according to claim 21 and wherein producing said plurality of metallic islands comprises sputtering said plurality of metallic islands.

25. A method according to claim 21 and wherein producing said plurality of metallic islands comprises electroless deposition of said plurality of metallic islands.

26. A method according to claim 21 and wherein producing said plurality of metallic islands comprises electrolytic deposition of said plurality of metallic islands.

27. A method according to claim 21 and wherein producing said plurality of metallic islands comprises hot-melt deposition of said plurality of metallic islands.

28. A method according to claim 1, and further comprising annealing said plurality of metallic islands on said transparent substrate.

29. A method according to claim 28, wherein said annealing is performed prior to adsorbing said chemical substance onto said plurality of metallic islands.

30. A method according to claim 29 wherein annealing said plurality of metallic islands on said transparent substrate comprises heating said plurality of metallic islands on said transparent substrate for up to 24 hours at up to 400 °C.

31. A method according to claim 30 wherein annealing said plurality of metallic islands on said transparent substrate comprises heating said plurality of metallic islands on said transparent substrate for up to 4 hours at up to 350 °C.

32. A method for analysis comprising:

producing a plurality of metallic islands on an intermediate layer on a transparent substrate;

transmitting electromagnetic radiation through said plurality of metallic islands on said intermediate layer on said transparent substrate;

measuring a resultant optical property of said plurality of metallic islands;

adsorbing a chemical substance onto said plurality of metallic islands so as to produce a chemical substance-metallic islands moiety on said intermediate layer on said transparent substrate;

transmitting electromagnetic radiation through said chemical substance-metallic islands moiety;

measuring a resultant optical property of metallic islands in said chemical substance-metallic islands moiety; and

employing said resultant optical property said metallic islands in said chemical substance-metallic islands moiety and said resultant optical property of said plurality of metallic islands so as to provide at least one of a quantitative indication and a qualitative indication of at least one of: said chemical substance-metallic islands moiety, a functionality of said chemical substance-metallic islands moiety, said plurality of metallic islands, a functionality of said plurality of metallic islands, said chemical substance and a functionality of said chemical substance.

33. A method according to claim 32 and wherein said intermediate layer comprises at least one metal oxide.

34. A method according to claim 33 and wherein said at least one metallic oxide comprises at least one of the following: chromium oxide, titanium oxide, nickel oxide, lead oxide and tin oxide.

35. A method according to claim 32 and wherein said intermediate layer comprises a metal.

36. A method according to claim 32 and wherein said intermediate layer comprises at least one of a nitrogen containing moiety, a sulfur containing moiety and an inorganic hydrogen-containing moiety.

37. A method according to claim 32 and wherein said intermediate layer comprises at least one of the following chemical groups: sulfhydryl, thiocyanate, thiol, sulfide, disulfide and amine.

38. A method according to claim 32 and wherein said intermediate layer comprises an organic layer.

39. A method according to claim 32, and wherein adsorbing said chemical substance comprises producing at least one of the following interactions between the chemical substance and said plurality of metallic islands: a hydrogen bond, an ionic bond, a covalent bond,

a Van der Waals force, an electrostatic force and a physical force.

40. A method according to claim 32, wherein transmitting said electromagnetic radiation through said plurality of metallic islands on said transparent substrate comprises transmitting electromagnetic radiation in the ultraviolet/visible/infra-red range.

41. A method according to claim 32, and wherein transmitting said electromagnetic radiation through said plurality of metallic islands on said transparent substrate comprises transmitting electromagnetic radiation in the range of 300-1100 nm.

42. A method according to claim 32, and wherein transmitting said electromagnetic radiation through said chemical substance-metallic islands moiety on said transparent substrate comprises transmitting electromagnetic radiation in the ultraviolet/visible/infra-red range.

43. A method according to claim 32, and wherein transmitting said electromagnetic radiation through said chemical substance-metallic islands moiety on said transparent substrate comprises transmitting electromagnetic radiation in the range of 300-1100 nm.

44. A method according to claim 32, and wherein transmitting said electromagnetic radiation through said plurality of metallic islands on said transparent

substrate includes transmitting electromagnetic radiation through said transparent substrate comprising at least one of the following: glass, plastic, polystyrene, a polymeric material, an inorganic oxide, quartz and mica.

45. A method according to claim 32, and wherein transmitting said electromagnetic radiation through said plurality of metallic islands on said transparent substrate includes transmitting electromagnetic radiation through said transparent substrate having a thickness of up to 5 mm.

46. A method according to claim 32, and wherein transmitting said electromagnetic radiation through said plurality of metallic islands on said transparent substrate includes transmitting electromagnetic radiation through metallic islands comprising at least one of the following: gold, silver, copper, titanium, vanadium, chromium, steel, at least one ultra-thin layer of a metal, a binary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium; or a ternary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium.

47. A method according to claim 32, and wherein said metallic islands are gold islands.

48. A method according to claim 32, and wherein transmitting said electromagnetic radiation through said plurality of metallic islands on said transparent substrate includes transmitting electromagnetic radiation

through metallic islands having a thickness of up to 400 ..ngstrom units.

49. A method according to claim 48, wherein the thickness is between 10 to 100 ..ngstrom units.

50. A method according to claim 32, and employing said resultant optical property of said plurality of metallic islands comprises measuring a change in a surface plasmon absorbance of said plurality of metallic islands.

51. A method according to claim 32, and wherein said resultant optical property of said plurality of metallic islands comprises a peak of maximal absorbance.

52. A method according to claim 32, and wherein said resultant optical property of said chemical substance-metallic islands moiety comprises a peak of maximal absorbance.

53. A method according to claim 32, and wherein said resultant optical property of said chemical substance-metallic islands moiety comprises an absorbance of said chemical substance-metallic islands moiety at a specific wavelength.

54. A method according to claim 32, and wherein measuring a resultant optical property of said chemical substance-metallic islands moiety on said transparent

substrate comprises performing real-time measurements of said optical property of said chemical substance-metallic islands moiety.

55. A method according to claim 32, and wherein employing said resultant optical property of said chemical substance-metallic islands moiety and said resultant optical property of said plurality of metallic islands comprises comparing said resultant optical property of said chemical substance-metallic islands moiety and said resultant optical property of said plurality of metallic islands.

56. A method according to claim 32, and wherein measuring a resultant optical property of said chemical substance-metallic islands moiety on said transparent substrate of said chemical substance-metallic islands moiety comprises performing continuous measurements of said optical property of said chemical substance-metallic islands moiety.

57. A method according to claim 32, and wherein measuring a resultant optical property of said chemical substance-metallic islands moiety on said transparent substrate comprises performing kinetic monitoring of said resultant optical property of said chemical substance-metallic islands moiety.

58. A method according to claim 32, and further comprising producing the plurality of metallic islands on the transparent substrate.

59. A method according to claim 59, and wherein producing said plurality of metallic islands producing said plurality of metallic islands from at least one of the following: gold, silver, copper, titanium, vanadium, chromium, steel, at least one ultra-thin layer of a metal, a binary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium; or a ternary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium.

60. A method according to claim 58 and wherein producing said plurality of metallic islands comprises evaporating said plurality of metallic islands.

61. A method according to claim 58 and wherein producing said plurality of metallic islands comprises sputtering said plurality of metallic islands.

62. A method according to claim 58 and wherein producing said plurality of metallic islands comprises electroless deposition of said plurality of metallic islands.

63. A method according to claim 58 and wherein producing said plurality of metallic islands comprises electrolytic deposition of said plurality of metallic islands.

64. A method according to claim 58 and wherein producing said plurality of metallic islands comprises hot-melt deposition of said plurality of metallic islands.

65. A method according to claim 32, and further comprising annealing said plurality of metallic islands on said transparent substrate.

66. A method according to claim 65, wherein said annealing is performed prior to adsorbing said chemical substance onto said plurality of metallic islands.

67. A method according to claim 66 wherein annealing said plurality of metallic islands on said transparent substrate comprises heating said plurality of metallic islands on said transparent substrate for up to 24 hours at up to 400 °C.

68. A method according to claim 67 wherein annealing said plurality of metallic islands on said transparent substrate comprises heating said plurality of metallic islands on said transparent substrate for up to 4 hours at up to 350 °C.

69. A method for analysis comprising:

transmitting electromagnetic radiation through a first chemical substance-metallic islands moiety on a transparent substrate;

measuring a resultant optical property of said first chemical substance-metallic islands moiety;

communicating said second chemical substance with said first chemical substance so as to form a second chemical substance-first chemical substance-metallic islands moiety;

transmitting electromagnetic radiation through said second chemical substance-first chemical substance-metallic islands moiety on said transparent substrate;

measuring a resultant optical property of metallic islands in said second chemical substance-first chemical substance-metallic islands moiety; and

employing said resultant optical property of metallic islands in said second chemical substance-first chemical substance-metallic islands moiety and said resultant optical property of said first chemical substance-metallic islands moiety so as to provide at least one of a quantitative indication and a qualitative indication of at least one of: said second chemical substance, a functionality of said second chemical substance, said second chemical substance-first chemical substance-metallic islands moiety, a functionality of said second chemical substance-first chemical substance-metallic islands moiety; said first chemical substance-metallic islands moiety, a functionality of said first chemical substance-metallic islands moiety; said plurality of metallic islands, a functionality of said plurality of metallic islands, said first chemical substance and a functionality of said first chemical substance.

70. A method according to claim 69 and wherein said first chemical substance comprises at least one of the following: a chemical ion, an organic molecule, a polymer, an inorganic molecule, an enzyme, a nucleic acid, an antibody, and an antigen.

71. A method according to claim 69 and wherein said second substance comprises at least one of the following: a chemical ion, an organic molecule, an inorganic molecule, a polymer, an enzyme, a nucleic acid, an antibody, and an antigen.

72. A method according to claim 69, and wherein communicating said second chemical substance with said first chemical substance comprises at least one of the following: a physical adsorption; a chemical adsorption; a chemical reaction; a antigen-antibody interaction; a hybridization reaction; an enzyme-substrate interaction; an enzyme inhibitor interaction; an amplification reaction, a polymerase chain reaction; and a precipitation.

73. A method according to claim 69, and wherein communicating said second chemical substance with said first chemical substance comprises producing at least one of the following interactions between the chemical substance and said plurality of metallic islands: a hydrogen bond, an ionic bond, a covalent bond, a Van der Waals force, an electrostatic force and a physical force.

74. A method according to claim 69, wherein transmitting said electromagnetic radiation through said first chemical substance-metallic islands moiety comprises transmitting electromagnetic radiation in the ultraviolet/visible/infra-red range.

75. A method according to claim 69, and wherein transmitting said electromagnetic radiation through said first chemical substance-metallic islands moiety comprises transmitting electromagnetic radiation in the range of 300-1100 nm.

76. A method according to claim 69, and wherein transmitting said electromagnetic radiation through said chemical substance-metallic islands moiety on said transparent substrate comprises transmitting electromagnetic radiation in the ultraviolet/visible/infra-red range.

77. A method according to claim 69, and wherein transmitting said electromagnetic radiation through said chemical substance-metallic islands moiety on said transparent substrate comprises transmitting electromagnetic radiation in the range of 300-1100 nm.

78. A method according to claim 69, and wherein transmitting said electromagnetic radiation through said plurality of metallic islands on said transparent substrate includes transmitting electromagnetic radiation through said transparent substrate comprising at least

one of the following: glass, plastic, polystyrene, a polymeric material, an inorganic oxide, quartz and mica.

79. A method according to claim 69, and wherein transmitting said electromagnetic radiation through said plurality of metallic islands on said transparent substrate includes transmitting electromagnetic radiation through said transparent substrate having a thickness of up to 5 mm.

80. A method according to claim 69, and wherein transmitting said electromagnetic radiation through said plurality of metallic islands on said transparent substrate includes transmitting electromagnetic radiation through metallic islands comprising at least one of the following: gold, silver, copper, titanium, vanadium, chromium, steel, at least one ultra-thin layer of a metal, a binary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium; or a ternary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium.

81. A method according to claim 69, and wherein said metallic islands are gold islands.

82. A method according to claim 69, and wherein transmitting said electromagnetic radiation through said plurality of metallic islands on said transparent substrate includes transmitting electromagnetic radiation through metallic islands having a thickness of up to 400 ..ngstrom units.

83. A method according to claim 82, wherein the thickness is between 10 to 100 ..ngstrom units.

84. A method according to claim 69, and employing said resultant optical property of said plurality of metallic islands comprises measuring a change in a surface plasmon absorbance of said plurality of metallic islands.

85. A method according to claim 69, and wherein said resultant optical property of said plurality of metallic islands comprises a peak of maximal absorbance.

86. A method according to claim 69, and wherein said resultant optical property of said chemical substance-metallic islands moiety comprises a peak of maximal absorbance.

87. A method according to claim 69, and wherein said resultant optical property of said chemical substance-metallic islands moiety comprises an absorbance of said chemical substance-metallic islands moiety at a specific wavelength.

88. A method according to claim 69, and wherein measuring a resultant optical property of said chemical substance-metallic islands moiety on said transparent substrate comprises performing real-time measurements of

said optical property of said chemical substance-metallic islands moiety.

89. A method according to claim 69, and wherein employing said resultant optical property of said chemical substance-metallic islands moiety and said resultant optical property of said plurality of metallic islands comprises comparing said resultant optical property of said chemical substance-metallic islands moiety and said resultant optical property of said plurality of metallic islands.

90. A method according to claim 69, and wherein measuring a resultant optical property of said chemical substance-metallic islands moiety on said transparent substrate of said chemical substance-metallic islands moiety comprises performing continuous measurements of said optical property of said chemical substance-metallic islands moiety.

91. A method according to claim 69, and wherein measuring a resultant optical property of said chemical substance-metallic islands moiety on said transparent substrate comprises performing kinetic monitoring of said resultant optical property of said chemical substance-metallic islands moiety.

92. A method according to claim 69, and further comprising producing the plurality of metallic islands on the transparent substrate.

93. A method according to claim 92, and wherein producing said plurality of metallic islands producing said plurality of metallic islands from at least one of the following: gold, silver, copper, titanium, vanadium, chromium, steel, at least one ultra-thin layer of a metal, a binary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium; or a ternary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium.

94. A method according to claim 92 and wherein producing said plurality of metallic islands comprises evaporating said plurality of metallic islands.

95. A method according to claim 92 and wherein producing said plurality of metallic islands comprises sputtering said plurality of metallic islands.

96. A method according to claim 92 and wherein producing said plurality of metallic islands comprises electroless deposition of said plurality of metallic islands.

97. A method according to claim 92 and wherein producing said plurality of metallic islands comprises electrolytic deposition of said plurality of metallic islands.

98. A method according to claim 92 and wherein producing said plurality of metallic islands comprises

hot-melt deposition of said plurality of metallic islands.

99. A method according to claim 67, and further comprising annealing said plurality of metallic islands on said transparent substrate.

100. A method according to claim 99, wherein said annealing is performed prior to adsorbing said chemical substance onto said plurality of metallic islands.

101. A method according to claim 100 wherein annealing said plurality of metallic islands on said transparent substrate comprises heating said plurality of metallic islands on said transparent substrate for up to 24 hours at up to 400 °C.

102. A method according to claim 101 wherein annealing said plurality of metallic islands on said transparent substrate comprises heating said plurality of metallic islands on said transparent substrate for up to 4 hours at up to 350 °C.

103. Apparatus for analysis comprising:

an adsorption enabling element operative to enable adsorption of a chemical substance onto a plurality of metallic islands on a transparent substrate so as to produce a chemical substance-metallic islands moiety;

a transmitter operative to transmit electromagnetic radiation through said plurality of metallic islands; and which is further operative to transmit electromagnetic radiation through said chemical substance-metallic islands moiety;

a detector adapted to detect a resultant optical property of said plurality of metallic islands, and further configured to detect a resultant optical property of metallic islands in said chemical substance-metallic islands moiety; and

a processor operative to employ said resultant optical property of said metallic islands in said chemical substance-metallic islands moiety and said resultant optical property of said plurality of metallic islands so as to provide at least one of a quantitative indication and a qualitative indication of at least one of: said chemical substance-metallic islands moiety, a functionality of said chemical substance-metallic islands moiety, said plurality of metallic islands, a functionality of said plurality of metallic islands, said chemical substance and a functionality of said chemical substance.

104. Apparatus according to claim 103, and wherein said adsorption enabling element is operative to produce at least one of the following interactions between the chemical substance and said plurality of metallic islands: a hydrogen bond, an ionic bond, a covalent bond, a Van der Waals force, an electrostatic force and a physical force.

105. Apparatus according to claim 103, and wherein said electromagnetic radiation comprises electromagnetic radiation in the ultraviolet/visible/infra-red range.

106. Apparatus according to claim 103, and wherein said electromagnetic radiation comprises electromagnetic radiation in the range of 300-1100 nm.

107. Apparatus according to claim 103, and wherein said transparent substrate includes at least one of the following: glass, plastic, polystyrene, a polymeric material, an inorganic oxide, quartz and mica.

108. Apparatus according to claim 103, and wherein said transparent substrate has a thickness of up to 5 mm.

109. Apparatus according to claim 103, and wherein said plurality of metallic islands includes at least one of the following: gold, silver, copper, titanium, vanadium, chromium, steel, at least one ultra-thin layer of a metal, a binary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium; or a ternary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium.

110. Apparatus according to claim 103, and wherein said metallic islands are gold islands.

111. Apparatus according to claim 103, and wherein said metallic islands have a thickness of up to 400 ..ngstrom units.

112. Apparatus according to claim 111, and wherein the thickness is between 10 to 100 ..ngstrom units.

113. Apparatus according to claim 103, and wherein said resultant optical property of said plurality of metallic islands comprises a change in a surface plasmon absorbance of said plurality of metallic islands.

114. Apparatus according to claim 103, and wherein said resultant optical property of said plurality of metallic islands comprises a peak of maximal absorbance.

115. Apparatus according to claim 103, and wherein said resultant optical property of said chemical substance-metallic islands moiety comprises a peak of maximal absorbance.

116. Apparatus according to claim 103, and wherein said resultant optical property of said chemical substance-metallic islands moiety comprises an absorbance of said chemical substance-metallic islands moiety at a specific wavelength.

117. Apparatus according to claim 103, and wherein said detector is further operative to perform real-time

measurements of said optical property of said chemical substance-metallic islands moiety.

118. Apparatus according to claim 103, and wherein said processor is further operative to compare said resultant optical property of said chemical substance-metallic islands moiety and said resultant optical property of said plurality of metallic islands.

119. Apparatus according to claim 103, and wherein said detector is further configured to perform continuous measurements of said optical property of said chemical substance-metallic islands moiety.

120. Apparatus according to claim 103, and wherein said detector is further configured to perform kinetic monitoring of said resultant optical property of said chemical substance-metallic islands moiety.

121. Apparatus according to claim 103, and further comprising a metal deposition element operative to produce the plurality of metallic islands on the transparent substrate.

122. Apparatus according to claim 121, and wherein said metal deposition element is operative to produce said plurality of metallic islands from at least one of the following: gold, silver, copper, titanium, vanadium, chromium, steel, at least one ultra-thin layer of a metal, a binary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium; or a

ternary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium.

123. Apparatus according to claim 121 and wherein said metal deposition element is operative to evaporate said plurality of metallic islands.

124. Apparatus according to claim 121 and wherein said metal deposition element is operative to sputter said plurality of metallic islands.

125. Apparatus according to claim 121 and wherein said metal deposition element is operative to deposit by electroless deposition said plurality of metallic islands.

126. Apparatus according to claim 121 and wherein said metal deposition element is operative to deposit by electrolytic deposition said plurality of metallic islands.

127. Apparatus according to claim 121 and wherein said metal deposition element is operative to deposit by a hot-melt deposition said plurality of metallic islands.

128. Apparatus according to claim 121, and further comprising a heating element operative to anneal said plurality of metallic islands on said transparent substrate.

129. Apparatus according to claim 121, and wherein said heating element is operative to heat said plurality of metallic islands for up to 24 hours at up to 400 °C.

130. Apparatus according to claim 129, and wherein said heating element is operative to heat said plurality of metallic islands for up to 4 hours at up to 350 °C.

131. Apparatus according to claim 121, and wherein said adsorption enabling element is further configured to enable adsorption of an intermediate layer on said transparent substrate.

132. Apparatus according to claim 131 and wherein said intermediate layer comprises at least one metal oxide.

133. Apparatus according to claim 131 and wherein said at least one metallic oxide comprises at least one of the following: chromium oxide, titanium oxide, nickel oxide, lead oxide and tin oxide.

134. Apparatus according to claim 133 and wherein said intermediate layer comprises a metal.

135. Apparatus according to claim 131 and wherein said intermediate layer comprises at least one of a nitrogen containing moiety, a sulfur containing moiety and an inorganic hydrogen-containing moiety.

136. Apparatus according to claim 135 and wherein said intermediate layer comprises at least one of the following chemical groups: sulfhydryl, thiocyanate, thiol, sulfide, disulfide and amine.

137. Apparatus according to claim 131 and wherein said intermediate layer comprises an organic layer.

138. Apparatus for analysis comprising:

an adsorption enabling element configured to enable adsorption of a chemical substance onto a plurality of metallic islands on a transparent substrate so as to produce a first chemical substance-metallic islands moiety; and further to enable adsorption of a second chemical substance so as to form a second chemical substance-first chemical substance-metallic islands moiety;

a transmitter operative to transmit electromagnetic radiation through said first chemical substance-metallic islands moiety and further operative to transmit electromagnetic radiation through said second chemical substance-first chemical substance-metallic islands moiety;

a detector operative to detect a resultant optical property of metallic islands in said first chemical substance-metallic islands moiety, and further configured to detect a resultant optical property of metallic islands in said second chemical substance-first chemical substance-metallic islands moiety;

a processor adapted to employ said resultant optical property of said metallic islands in said first chemical substance-metallic islands moiety and said resultant optical property of said of metallic islands in said second chemical substance-first chemical substance-metallic islands moiety so as to provide at least one of a quantitative indication and a qualitative indication of at least one of: said second chemical substance, a functionality of said second chemical substance, said second chemical substance-first chemical substance-metallic islands moiety, a functionality of said second chemical substance-first chemical substance-metallic islands moiety; said first chemical substance-metallic islands moiety, a functionality of said first chemical substance-metallic islands moiety; said plurality of metallic islands, a functionality of said plurality of metallic islands, said first chemical substance and a functionality of said first chemical substance.

139. Apparatus according to claim 138 and wherein said first chemical substance comprises at least one of the following: a chemical ion, an organic molecule, a polymer, an inorganic molecule, an enzyme, a nucleic acid, an antibody, and an antigen.

140. Apparatus according to claim 138 and wherein said first second substance comprises at least one of the following: a chemical ion, an organic molecule, an inorganic molecule, a polymer, an enzyme, a nucleic acid, an antibody, and an antigen.

141. Apparatus according to claim 138, and wherein said adsorption enabling element is further configured to enable communication of said second chemical substance with said first chemical substance by means of at least one of the following: a physical adsorption; a chemical adsorption; a chemical reaction; a antigen-antibody interaction; a hybridization reaction; an enzyme-substrate interaction; an enzyme inhibitor interaction; an amplification reaction, a polymerase chain reaction; and a precipitation.

142. Apparatus according to claim 138, and wherein said adsorption enabling element is further configured to produce at least one of the following interactions: a hydrogen bond, an ionic bond, a covalent bond, a Van der Waals force, an electrostatic force and a physical force.

143. Apparatus according to claim 138, and wherein said electromagnetic radiation comprises electromagnetic radiation in the ultraviolet/visible/infra-red range.

144. Apparatus according to claim 138, and wherein said electromagnetic radiation comprises electromagnetic radiation in the range of 300-1100 nm.

145. Apparatus according to claim 138, and wherein said transparent substrate includes at least one of the following: glass, plastic, polystyrene, a polymeric material, an inorganic oxide, quartz and mica.

146. Apparatus according to claim 138, and wherein said transparent substrate has a thickness of up to 5 mm.

147. Apparatus according to claim 138, and wherein said plurality of metallic islands includes at least one of the following: gold, silver, copper, titanium, vanadium, chromium, steel, at least one ultra-thin layer of a metal, a binary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium; or a ternary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium.

148. Apparatus according to claim 147, and wherein said metallic islands are gold islands.

149. Apparatus according to claim 147, and wherein said metallic islands have a thickness of up to 400 _ngstrom units.

150. Apparatus according to claim 149, and wherein the thickness is between 10 to 100 _ngstrom units.

151. Apparatus according to claim 138, and wherein said detector is further operative to detect a change in a surface plasmon absorbance.

152. Apparatus according to claim 138, and wherein said detector is further operative to detect a peak of maximal absorbance.

152. Apparatus according to claim 138, and wherein said detector is further operative to detect a spectrum.

153. Apparatus according to claim 138, and wherein said detector is further operative to detect an absorbance of said chemical substance-metallic islands moiety at a specific wavelength.

154. Apparatus according to claim 138, and wherein said detector is further operative to perform real-time measurements.

155. Apparatus according to claim 138, and wherein said processor is further operative to compare said resultant optical property of said first chemical substance-metallic islands moiety and said resultant optical property of said second chemical substance-first chemical substance-metallic islands moiety.

156. Apparatus according to claim 138, and wherein said detector is further configured to perform continuous measurements of said optical property of said chemical substance-metallic islands moiety.

157. Apparatus according to claim 138, and wherein said detector is further configured to perform continuous measurements of said optical property of said second chemical substance-first chemical substance-metallic islands moiety.

158. Apparatus according to claim 138, and wherein said detector is further configured to perform kinetic monitoring of said resultant optical property of said first chemical substance-metallic islands moiety.

159. Apparatus according to claim 138, and further comprising a metal deposition element operative to produce the plurality of metallic islands on the transparent substrate.

160. Apparatus according to claim 159, and wherein said metal deposition element is operative to produce said plurality of metallic islands from at least one of the following: gold, silver, copper, titanium, vanadium, chromium, steel, at least one ultra-thin layer of a metal, a binary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium; or a ternary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium.

161. Apparatus according to claim 159, and wherein said metal deposition element is operative to evaporate said plurality of metallic islands.

162. Apparatus according to claim 159, and wherein said metal deposition element is operative to sputter said plurality of metallic islands.

163. Apparatus according to claim 159, and wherein said metal deposition element is operative to deposit by

electroless deposition said plurality of metallic islands.

164. Apparatus according to claim 159 and wherein said metal deposition element is operative to deposit by electrolytic deposition said plurality of metallic islands.

165. Apparatus according to claim 159 and wherein said metal deposition element is operative to deposit by a hot-melt deposition said plurality of metallic islands.

166. Apparatus according to claim 138, and further comprising a heating element operative to anneal said plurality of metallic islands on said transparent substrate.

167. Apparatus according to claim 166, and wherein said heating element is operative to heat said plurality of metallic islands for up to 24 hours at up to 400 °C.

168. Apparatus according to claim 167, and wherein said heating element is operative to heat said plurality of metallic islands for up to 4 hours at up to 350 °C.

169. Apparatus according to claim 138, and wherein said adsorption enabling element is further configured to enable adsorption of an intermediate layer on said transparent substrate.

170. Apparatus according to claim 169 and wherein said intermediate layer comprises at least one metal oxide.

171. Apparatus according to claim 170 and wherein said at least one metallic oxide comprises at least one of the following: chromium oxide, titanium oxide, nickel oxide, lead oxide and tin oxide.

172. Apparatus according to claim 169 and wherein said intermediate layer comprises a metal.

173. Apparatus according to claim 169 and wherein said intermediate layer comprises at least one of a nitrogen containing moiety, a sulfur containing moiety and an inorganic hydrogen-containing moiety.

174. Apparatus according to claim 173 and wherein said intermediate layer comprises at least one of the following chemical groups: sulfhydryl, thiocyanate, thiol, sulfide, disulfide and amine.

175. Apparatus according to claim 169, and wherein said intermediate layer comprises an organic layer.

176. A kit for analysis comprising:

a plurality of metallic islands on a transparent substrate;

a transmitter configured to transmit electromagnetic radiation through said plurality of metallic islands on said transparent substrate, and further configured to transmit electromagnetic radiation through a chemical substance-metallic islands moiety on said transparent substrate;

a detector adapted to detect a resultant optical property of said plurality of metallic islands, and further configured to detect a resultant optical property of metallic islands in said chemical substance-metallic islands moiety; and

a processor configured to employ said resultant optical property of said metallic islands in chemical substance-metallic islands moiety with and resultant optical property of said plurality of metallic islands so as to provide at least one of a quantitative indication and a qualitative indication of at least one of: said chemical substance-metallic islands moiety, a functionality of said chemical substance-metallic islands moiety, said plurality of metallic islands, a functionality of said plurality of metallic islands, said chemical substance and a functionality of said chemical substance.

177. A kit for analysis comprising:

a first chemical substance adsorbed onto plurality of metallic islands on a transparent substrate so as to form a first chemical substance-metallic islands moiety; and wherein said first chemical substance-metallic islands moiety is configured to bind a second chemical substance so as to form a second chemical

substance-first chemical substance-metallic islands moiety;

a transmitter operative to transmit electromagnetic radiation through said first chemical substance-metallic islands moiety and which is further operative to transmit electromagnetic radiation through said second chemical substance-first chemical substance-metallic islands moiety;

a detector adapted to detect a resultant optical property of metallic islands in said first chemical substance-metallic islands moiety, and further configured to detect a resultant optical property of metallic islands in said second chemical substance-first chemical substance-metallic islands moiety;

a processor adapted to employ said resultant optical property of said metallic islands in said chemical substance-metallic islands moiety and said resultant optical property of said metallic islands in said second chemical substance-first chemical substance-metallic islands moiety so as to provide at least one of a quantitative indication and a qualitative indication of at least one of: said second chemical substance, a functionality of said second chemical substance, said second chemical substance-first chemical substance-metallic islands moiety, a functionality of said second chemical substance-first chemical substance-metallic islands moiety; said first chemical substance-metallic islands moiety, a functionality of said first chemical substance-metallic islands moiety; said plurality of metallic islands, a functionality of said plurality of metallic islands, said first chemical substance and a functionality of said first chemical substance.

178. An optical sensor for analysis comprising:

a plurality of metallic islands on a transparent substrate;

a transmitter configured to transmit electromagnetic radiation through said plurality of metallic islands on said transparent substrate, and further configured to transmit electromagnetic radiation through a chemical substance-metallic islands moiety on said transparent substrate;

a detector adapted to detect a resultant optical property of said plurality of metallic islands, and further configured to detect a resultant optical property of metallic islands in said chemical substance-metallic islands moiety; and

a processor adapted to employ said resultant optical property of said metallic islands in said chemical substance-metallic islands moiety and said resultant optical property of said plurality of metallic islands so as to provide at least one of a quantitative indication and a qualitative indication of at least one of: said chemical substance-metallic islands moiety, a functionality of said chemical substance-metallic islands moiety, said plurality of metallic islands, a functionality of said plurality of metallic islands, said chemical substance and a functionality of said chemical substance.

179. An optical sensor for analysis comprising:

a first chemical substance adsorbed onto plurality of metallic islands on a transparent substrate

so as to form a first chemical substance-metallic islands moiety;

a transmitter configured to transmit electromagnetic radiation through said first chemical substance-metallic islands moiety on said transparent substrate, and further configured to transmit electromagnetic radiation through said second chemical substance-first chemical substance-metallic islands moiety on said transparent substrate;

a detector adapted to detect a resultant optical property of metallic islands in said first chemical substance-metallic islands moiety, and further configured to detect a resultant optical property of metallic islands in said second chemical substance-first chemical substance-metallic islands moiety; and

a processor adapted to employ said resultant optical property of said metallic islands in said chemical substance-metallic islands moiety and said resultant optical property of said metallic islands in said second chemical substance-first chemical substance-metallic islands moiety so as to provide at least one of a quantitative indication and a qualitative indication of at least one of: said second chemical substance, a functionality of said second chemical substance, said second chemical substance-first chemical substance-metallic islands moiety, a functionality of said second chemical substance-first chemical substance-metallic islands moiety; said first chemical substance-metallic islands moiety, a functionality of said first chemical substance-metallic islands moiety; said plurality of metallic islands, a functionality of said plurality of metallic islands, said first chemical substance and a functionality of said first chemical substance.

180. A computer program product for analysis, the product comprising a computer-readable medium having program instructions embodied therein, which instructions, when read by a computer, cause the computer to:

transmit electromagnetic radiation through a plurality of metallic islands on a transparent substrate;

measure an optical property of a plurality of metallic islands on a transparent substrate;

adsorb a chemical substance onto said plurality of metallic islands so as to produce a chemical substance-metallic islands moiety on said transparent substrate;

transmit electromagnetic radiation through said chemical substance-metallic islands moiety;

measure an optical property of metallic island in said chemical substance-metallic islands moiety; and

compare said optical property of metallic islands in said chemical substance-metallic islands moiety with said optical property of said plurality of metallic islands so as to provide at least one of a quantitative indication and a qualitative indication of at least one of: said chemical substance-metallic islands moiety, a functionality of said chemical substance-metallic islands moiety, said plurality of metallic islands, a functionality of said plurality of metallic islands, said chemical substance and a functionality of said chemical substance.

181. A computer program product for analysis, the product comprising a computer-readable medium having program instructions embodied therein, which instructions, when read by a computer, cause the computer to:

transmit electromagnetic radiation through a first chemical substance-metallic islands moiety;

measure an optical property of said first chemical substance-metallic islands moiety on a transparent substrate;

communicate said second chemical substance with said first chemical substance so as to form a second chemical substance-first chemical substance-metallic islands moiety;

transmit electromagnetic radiation through said second chemical substance- first chemical substance-metallic islands moiety;

measure said optical property of metallic islands in said second chemical substance-first chemical substance-metallic islands moiety; and

compare said optical property of said metallic islands in said second chemical substance-first chemical substance-metallic islands moiety with said optical property of said first chemical substance-metallic islands moiety so as to provide at least one of a quantitative indication and a qualitative indication of at least one of: said second chemical substance, a functionality of said second chemical substance, said second chemical substance-first chemical substance-metallic islands moiety, a functionality of said second chemical substance-first chemical substance-metallic islands moiety; said first chemical substance-metallic

islands moiety, a functionality of said first chemical substance-metallic islands moiety; said plurality of metallic islands, a functionality of said plurality of metallic islands, said first chemical substance and a functionality of said first chemical substance.